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[ORIGINAL COMMUNICATION.]

SOLUBILITY OF LITHIUM CITRATE.

BY W. A. PUCKNER.

SOME time ago I was called upon to dispense the following prescription:

℞
Lithii citratis..... ℥i.
Aquæ..... q. s. ad fl. ℥iv.

I was surprised to obtain a perfect solution, though the United States Pharmacopœia states that it requires 5.5 parts of water at 15° C. for solution.

It occurred to me that I might have on hand the hydrated salt; but two samples, the only ones obtainable, lost on drying at 115° C. only 4.93 per cent and 5.05 per cent, corresponding closely to the monohydrated salt, $Li_3C_6H_5O_7.H_2O$, obtained by drying at 100° C. and containing, theoretically, 5.11 per cent of water of crystallization.

I next proceeded to prepare lithium citrate by saturating a warm solution of citric acid with lithium carbonate (Merck's), testing with litmus after expelling CO_2. This solution was filtered and concentrated by evaporation. The crystalline crusts obtained on cooling were pressed between bibulous paper at 20° to 24° C. for two days and then coarsely powdered.

In order to ascertain the accuracy of determining lithium as Li_2SO_4, as well as to judge the nature of the product, I determined the water of crystallization as follows: About 1 Gm. was weighed into a platinum crucible and the salt dried, first at a low temperature, then at 100° C., and finally at 115°; it was then allowed to cool, 1 to 2 Gm. strong sulphuric acid added, and then warmed gently, gradually and carefully increasing the heat until the decomposition was complete and the excess of H_2SO_4 expelled. This most tedious way of manipulating was found necessary to prevent loss by "spattering." In preference to then expelling the carbon by ignition, I again moistened the mass with H_2SO_4 and heated gently, thus expelling it as CO_2; on repeating this a second time the residue was found perfectly white; the crucible was now heated to dull redness until the weight was constant.

The formula $Li_3C_6H_5O_7.4H_2O$ requires 74.46 per cent of lithium citrate. By the above method I found 73.48 per cent and 73.51 per cent, giving an average of 73.495 per cent. The residue obtained by drying the crystalline salt, at first at a low temperature and finally at 115° C., amounted to 73.807 per cent, indicating that 0.312 per cent of water was still present in the salt. The dried salt determined as Li_2SO_4 gave 99.620 and 99.679 per cent, or an average of 99.649 per cent, of lithium citrate. The determination of the hydrated salt showed 26.505 per cent of water. On drying it lost 26.193 per cent; while the determination of the dried salt as Li_2SO_4 showed 0.294 per cent still present: 26.193 + 0.294 = 26.487 per cent against 26.505 per cent as found by direct determination, showing an error of 0.018 per cent in the two determinations.

The solubility of the dried citrate was determined as follows: Distilled water was agitated with an excess of the salt for several days at a temperature of about 25° C.; the flask was then immersed in water at 22° C., and kept thus for twelve to thirteen hours; the solution was then filtered through a closely covered funnel surrounded by water at 22° C. Two portions of this solution were weighed into crucibles and determined as Li_2SO_4. The result gave a solubility of 1 in 2.308 and 2.311. A duplicate experiment gave 1 in 2.322 and 2 329. An average of four determinations gave *the solubility of lithium citrate, U. S. P., at 22° C., as 1 in 2.32.*

Manipulating as before, but with final temperature at 150° C., I found a solubility in the first experiment of 1 in 2.367 and 2.375; in the second 1 in 2.342 and 2.357; in the third 1 in 2.392 and 2.402, or a general average *solubility of lithium citrate, U. S. P., at 15° C., as 1 in 2.37.*

[ORIGINAL COMMUNICATION.]

ANTISEPTICS AND THEIR CLASSIFICATION.

BY THOMAS J. KEENAN.

THE confusion which results from the failure to distinguish with sufficient clearness between the application of the words *antiseptic* and *disinfectant* has been quite recently emphasized by the publication of a work on materia medica, several chapters of which are devoted to a survey and classification of the principal drugs known to possess properties of an antiseptic or disinfectant nature, but including both under the one general heading "disinfectants."

Now, an *antiseptic*, strictly so-called, will not perform the function of a *disinfectant;* the range of action of the former being different and limited to the prevention of infection or sepsis, whilst the latter, a disinfectant, acts by directly killing the infectious organisms and their spores.

Yet, in the work alluded to, we find such drugs as salicin, naphtalin, benzoin, and camphor, along with others of a similarly antiseptic character, classed as "special disinfectants."

Of course, until the specific antagonistic action of each antiseptic or disinfectant agent has been discovered and demonstrated, our work must necessarily proceed on lines of a more or less empirical order, attempted classifications only serving the purpose of tabulating the general action of each, in the manner indicated.

Bearing these facts in mind, and with the object of thus tabulating the uses and derivations of the more important antiseptic agents in ordinary use by physicians and pharmacists, I have divided these into three principal *groups*, indicative of their application, viz.:

Surgical Antiseptics.—Agents capable of keeping sterile the exposed tissues and field of operation during the progress of a surgical performance, and of preserving afterwards the asepticity of the parts operated on.

Medical Antiseptics.—Drugs used in the treatment of intestinal sepsis and fermentation, etc., and in the treatment of parasitic diseases of the skin, etc.

Pharmaceutical Antiseptics.—Agents employed in the preservation of those organic chemical solutions, etc., that are liable to undergo decomposition from the development of fermentation, or of growths of a fungoid nature.

These I have again subdivided into classes indicative of their derivation, as before stated—namely, into chemical bodies of the *phenol*, *mercury*, and *iodine* classes, as follows:

CLASSIFICATION OF ANTISEPTICS.

I *Antiseptic Drugs Classed According to their Uses.*

1. *Surgical Antiseptics:* Bichloride of mercury, red iodide of mercury, carbolic acid, cresol and its combinations, creolin, lysol, naphtalin and its combinations, thymol and its combinations, salicylic acid, boric acid,

europhen,* aristol,† iodoform, dermatol,‡ acetate of aluminum, permanganate of potassium, hydrogen dioxide, iodol.

2. *Medical Antiseptics:* Salol, salicylic acid and its salts, nitrate of silver, creosote, naphtalin and its combinations, resorcin, bismuth and its combinations, benzoin and its combinations, europhen, aristol, iodoform, dermatol, camphor, sodium sulphite, zinc sulphite, potassium sulphite, oil of cinnamon, oil of fennel, oil of peppermint, oil of wintergreen.

3. *Pharmaceutical Antiseptics:* Salicylic acid, acetanilide, chloroform, alcohol, glycerin, chloral, boric acid.

II. *Antiseptic Drugs Classed According to their Derivation.*

1. *Phenol Class:* Carbolic acid, cresol, creolin, lysol, creosote, salicylic acid, salol, naphtalin, thymol, europhen, aristol, resorcin, benzoin, acetanilide, camphor, oil of cinnamon, oil of fennel, oil of peppermint, oil of wintergreen.

2. *Mercury Class:* Bichloride of mercury, red iodide of mercury.

3. *Iodine Class:* Iodoform, iodol.

4. *Unclassified:* Nitrate of silver, bismuth combinations, dermatol, alcohol, glycerin, chloroform, chloral, sulphur combinations, acetate of aluminum, boric acid, permanganate of potassium, hydrogen dioxide.

Whilst recognizing the existence of a host of other remedial agents exercising differing degrees of antiseptic potency, the amount of space at my disposal does not permit of an extended description, nor would it even be desirable to fully tabulate the known antagonistic action of these bodies on the different micro-organisms, bacteria, or germs of disease, the subject embracing too much of an unknown territory to warrant doing so.

Many efficient drugs are allowed to go out of use in favor of proprietary or patented preparations, by reason of the persistency with which the alleged virtues, etc., of these latter are brought before the attention of physicians and pharmacists through advertising and similar methods. The iodo-sulphate of cinchonine—made by precipitating an aqueous solution of sulphate of cinchonine with one of iodine and iodide of potassium, as proposed by Yvon, and named "antiseptol" for brevity—was introduced and used with favorable results as a substitute for iodoform, over which it possesses the advantages of being more free from odor, less easily decomposed, and costing less to prepare. The following is the formula given in the AMERICAN DRUGGIST of January 15th, 1891, and which I have successfully employed for its production:

I.

℞ Sulphate of Cinchonine	1 Gm.
Water	80 "

Dissolve.

II.

℞ Iodine	1 Gm.
Potassium Iodide	10 "
Water	1,000 "

The second solution is added to the first, care being exercised to avoid an excess. Collect the precipitate on a filter in the usual manner, wash thoroughly to remove traces of iodine, and finally dry in the open air.

This is but one of a long list of chemical agents, the result of frequent efforts to produce an equally powerful body without the disagreeable odor or peculiar toxic effects so distinctive of that ubiquitous substance, iodoform.

Probably the very latest of these products, *iodo-di-iso-butyl-ortho-cresol*, and which has received the more euphonious title of "europhen" from its patentees, approaches most nearly to the desired perfection of action, being endowed with the maximum amount of antiseptic potency and the minimum of disagreeable features.

Cheap but reliable substitutes for these expensive proprietary preparations, as well as for iodoform, however, are always in demand. The following formula is used largely in the hospital wards of a city institution in the treatment of chronic ulcers, suppurating sores, and generally as an iodoform substitute:

℞ Salol, powdered	1 ounce.
Sulphite of Zinc, powdered	1½ ounces.
Benzoin, powdered	½ ounce.
Purified Talcum	2 ounces.
Oil of Fennel	20 minims.

M. et Sig., "Improved Antiseptic Powder."

NEW YORK, November, 1891.

* Iodo-di-iso-butyl-ortho-cresol. † Di-iodo-di-thymol.
‡ Basic gallate of bismuth.

Lead in Citric Acid.

MANY of the most recent pharmacopœias require citric acid to be absolutely free from contaminations. At a recent meeting of the Pharmaceutical Society at Berlin, Mr. H. Thoms stated that, apparently in response to a demand for citric acid of strict purity, a number of firms were selling, besides "acidum citricum purissimum," also an "acidum citricum purum Pharm. G. III." On making inquiry why an acid corresponding to the rigorous requirements of the German Pharmacopœia was designated merely "purum," while there was still a better grade, "purissimum," Mr. Thoms was informed that since English manufacturers had also begun to produce a citric acid free from lead, the price of this had become reduced.

On examining this English acid, however, Mr. Thoms found it to be by no means free from lead. If only 0.5 Gm., or perhaps as much as 2.0 Gm., of the acid are tested with hydrogen sulphide in a test tube, the tint produced by the sulphide of lead formed may escape notice. But if 5 Gm. are taken, dissolved in water in a beaker, the latter placed on white paper and then treated with hydrogen sulphide, the brownish color appears plainly. That this is not due to iron, as was asserted by one of the firms from whom Mr. Thoms obtained his samples, is evident from the fact that if hydrogen sulphide was passed through the acid liquid it required only a few drops of ammonia to reveal the presence of lead sulphide. Moreover, on incinerating 5 Gm. of the acid, the ash, weighing about 1 Mgm., though containing faint traces of iron, was found to consist chiefly of lead.

The author therefore recommends to make the test for lead in citric acid as follows: A solution of 5 Gm. of citric acid in 60 Cc. of water mixed with enough ammonia to leave it still slightly acid, and contained in a beaker glass standing upon white paper, should remain unaffected when treated with hydrogen sulphide.—After *Berichte d. Pharm. Ges.*, 1891, 402.

Artificial Coloring of Real Flowers.

THE flower sellers of Paris were much excited recently by the appearance of green carnations exposed for sale and eagerly bought, the novelties fetching in some cases 2 francs apiece. The ubiquitous Paris policeman was on the alert for a swindle of some kind, and some of the extraordinary blossoms were handed to M. Girard, of the municipal laboratory. He discovered that the artificial tint had been produced by steeping the stems of freshly cut flowers in a chemical coloring matter, which mounted the stem by capillary attraction and was oxidized on contact with the air. The flower preserves its odor, the coloring is inoffensive, and only the parts exposed to the air are thus tinted. It seems that one day some women employed in the manufacture of artificial flowers poured by accident, into a pot wherein stood white pinks or carnations, a little green color they were using, and, noticing that the flowers turned a green shade, thus discovered the process. M. Girard has followed up the experience. So far only three colors have been obtained, green-violet, violet, and pink. Green is produced by a bright green or "tetrae" [?]; the violet by methyl violet or Paris violet, pink by fuchsine (hydrochlorate of rosaniline). A greenish blue has likewise been attained by the use of "tetrae." The Parisian press hints that the traditional bridal orange flowers can now be obtained of a delicate violet, suitable for ladies entering for a second time into the holy state of matrimony.—*Chem. and Drugg.*

LABORATORY APPARATUS.

At a meeting of the "Pharmaceutische Gesellschaft" (Berlin), held on December 3d, 1891, Mr. Gustav Christ described some new laboratory machines of great practical utility.

One of these is a hot-air motor, of which two sizes are manufactured, the smaller one of which is heated by an alcohol lamp, the larger one with a gas flame. The principle upon which these motors are constructed appears to be the same as that in Ericsson's motors, viz., expansion of air by heat, and thereby upward motion of a piston, while the downward motion is caused by the refrigeration of the expanded air and the consequent production of a partial vacuum. Fig. 1 illustrates this motor as applied to a mechanical stirrer. The latter is described as an improved form, inasmuch as it makes a turn through half a circle in one direction, and then reverses its motion, returning to the starting place. The inventor calls this an "Eccentric Stirrer."

These motors may, of course, be employed for a variety of purposes, such as turning centrifugal machines, sugar-coating kettles, ventilators, agitators, pill silverers, etc.

A small vacuum apparatus is shown in Fig. 3. The vessel at the left surmounted by the glass globe is the evaporating pan, the apparatus at the right a condenser fed with cold water, which is connected with an efficient air pump, shown in Fig. 4, which latter is (probably) also supplied with shafting to be set in motion by a motor. Fig. 2 represents a centrifuge, which is so constructed that the revolving drum is not immovably attached to the axis of motion, but is set gradually in motion by the latter, which makes its revolution much more easy and steady. The centrifugal drum can make about 1,400 revolutions per minute.

All the before-described machines are manufactured by Mr. Christ, and may be obtained through importers of chemical apparatus.—After *Berichte d. Pharm. Ges.*, 1891, 382.

3028, 3029, 3030, 3031]

Fig. 1.

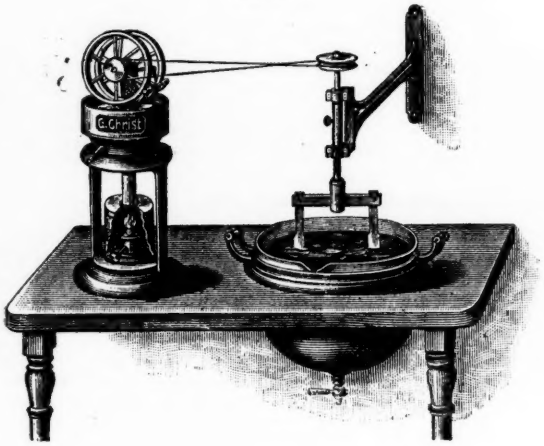


Fig. 2.

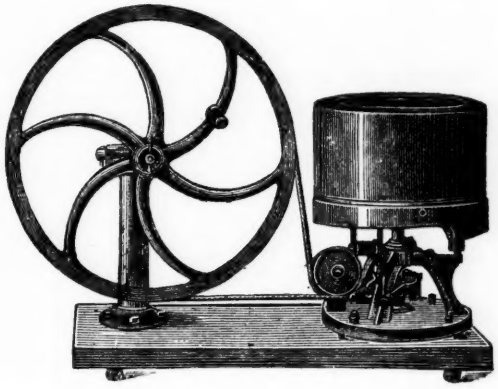


Fig. 3.

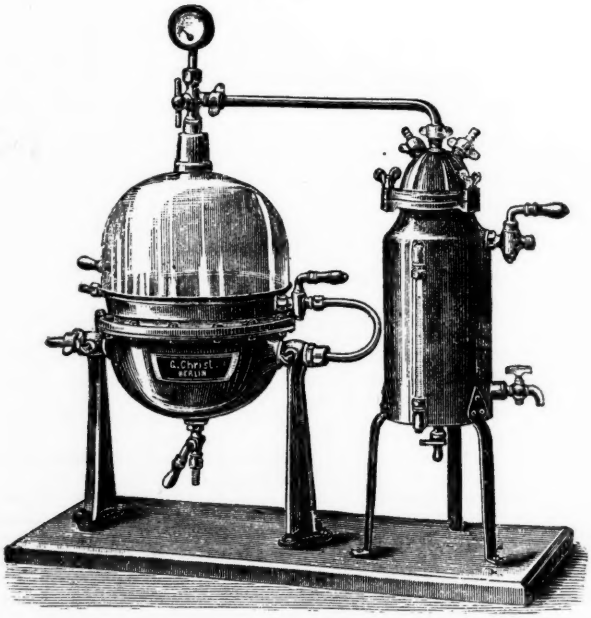
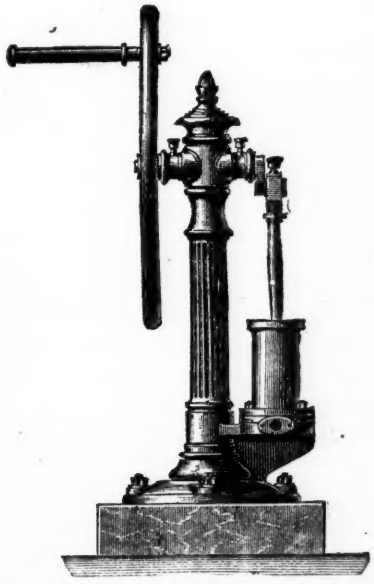


Fig. 4.



Christ's Laboratory Apparatus:—Fig. 1, Caloric Motor and Eccentric Stirrer; Fig. 2, Centrifuge; Fig. 3, Vacuum Apparatus; Fig. 4, Air Pump.

IDENTIFICATION OF BLOOD.

BY

CHAS. O. CURTMAN, M.D.,

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THE question whether a red-colored liquid contains blood or not may be readily answered by microscopical observation of the form elements. But the determination of the kind of animal from which the blood is derived is involved in much more difficulty. The red blood corpuscles of some species differ in shape and size so materially that the recognition of a nucleus, or of an elliptical shape, will at once assure us that the blood containing such corpuscles cannot be derived from the group of animals having red globules of a circular or disc-shaped form. To differentiate the blood of a chicken from that of a man is, therefore, an easy task; but when we have to decide, as frequently occurs in practice, between the blood of the dog and that of man, or between the blood of other animals characterized by round red blood corpuscles, the question becomes much more difficult to answer and often leaves us involved in doubts and uncertainty. A comparison of the tables of average diameters of round red blood corpuscles of various animals, as given in our text books, will show us that the figures of even the most accurate observers differ materially from each other in the measurement of specimens derived from the same kind of animal. And it is not only the older and the more modern observations which show this difference, but practised observers, furnished with the best instruments of improved modern construction, still exhibit differences which cannot be ascribed to faulty micrometers or want of experimental skill. In the accompanying table a few of the measurements by different observers at different times, are collated to show the extent of such discrepancies.

In forensic cases the question to be decided is most frequently whether certain spots found under suspicious circumstances are really blood, and, if so, whether the blood is human or derived from some other animal. And in spite of all our modern auxiliaries, the expert will not always be able to decide that question with entire certainty. True, if the corpuscles found are all of elliptical form, the possibility of their human origin is at once excluded, for only round, disc-shaped red cells have been observed in the blood of man. Or if round cells are found, the great majority of which have a diameter less than 7 micromillimetres ($\frac{1}{256}$ inch) or larger than 8 micromillimetres ($\frac{1}{315}$ inch), the opinion is fully justified that they do not belong to human blood. When, however, the average measure lies between these extreme limits, we may talk of a possibility that we have human blood before us, but not of a certainty. For the diameter of the red blood corpuscles of several varieties of animals closely approaches that of the human; among them the dog, the monkey, the opossum, the guineapig, the muskrat may be mentioned. The blood corpuscles of the dog, the constant companion of man, are on an average less in size than those of man by a small but measurable difference, as can be easily seen from the comparative sizes of round discs, of the dimensions of from 7 to 8 micromillimetres, rightly magnified and represented in the plate on the opposite page.

But the limits of the maxima and minima of the cells of both dog and man are so sufficiently distant from their means that they frequently overlap, and we may speak of probability, but not of certainty, in identification. So experienced an observer as Surgeon J. J. Woodward, in a report on over one thousand comparative measurements made by himself, sums up as follows:

"It will be observed that three of the above means for human blood, Nos. 1, 3, and 7 (out of thirteen series of about fifty specimens each), are a trifle larger than any of those of dog's blood; and two of the latter, Nos. 7 and 8 (out of nine series of specimens of dog's blood), are a trifle smaller than any of those for human blood. All the other means for the dog are within the range of the values found for human blood, and the majority of them are each identical, even to the last decimal place, with some of those found for man."

In fact, individuals of the human race, as well as those of the various breeds of dogs, differ much more in the size of their red blood corpuscles than writers usually concede. I quote differences of blood taken at different

DIAMETER OF RED BLOOD CORPUSCLES, IN MICROMILLIMETRES.*

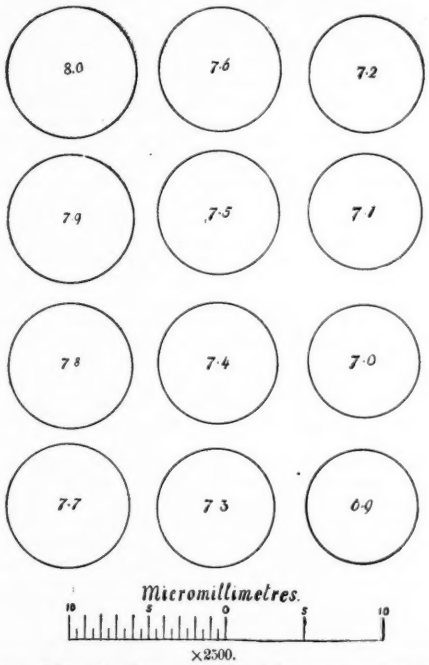
	Gulliver, 1840.	Welker, 1868.	Brucke, 1875.	Bizzozero, 1883.	Landois, 1880.	Wormley, 1885.	Woodward, 1875.	Austin Flint, Jr.	Friedberg.	Curtman and Evers, 1890. in glycerin.	Curtman and Evers, 1890. in alcohol.	Ewell and Tollmann, 1888.	Vorce, 1884.	Fasold and Shanks, 1886.	Koellicker.	Carl Schmid, 1864.
Elephant	9.2	....	9.3	9.4	9.4	9.28	.....	....	...	....	....	....	...	....	...	....
Whale	7.74	...	8.2	....	....	...	.....	....	....	....	....	....	....	....	....	....
Man. Average	7.93	7.68 to 7.74	7.93	7.0 to 7.5	7.7	7.80 to 7.83	7.31 to 7.72	7.26	7.0	7.4	6.9	8.09	7.58 to 7.7	7.9	7.51	7.7
" Maximum	10.58	8.6	....	...	...	8.89	8.64	....	...	....	....	....	...	....	....	....
" Minimum	5.20	6.4	....	....	....	6.60	6.096	....	5.8	....	...	....	....	...	....	....
Opossum	7.14	.	...	....	....	8.07	.....	....	....	...	....	....	....	....	...	....
Seal	7.73	...	7.75	....	...	....	.....	..	....	....	....	...	.. ..	. .	....	...
Monkey	7.44	....	....	....	...	7.51	.....	..	....	....	...	....	....	....	....	....
Dog. Average	7.18	7.3	7.2	7.3	7.3	7.13	7.24 to 7.59	...	8.6	....	...	....	....	....	....	....
" Maximum	9.15	....	....	....	....	...	8.64	...	5.4	....	....	...	....	....	....	...
" Minimum	6.35	...	..	....	....	....	6.096	...	.	....	....	...	....	....	....	....
Guineapig	7.18	...	....	....	...	6.95	.....	....	...	...	....	....	....	....	....	....
Rabbit	7.04	....	....	6.9	6.9	6.95	.....	....	....	....	...	....	....	....	....	...
Kangaroo	7.3	....	....	....	....	7.44	.....	....	...	....	...	....	....	....	....	....
Rat	6.76	....	....	6.3	..	6.95	.....	..	...	....	....	....	....	....	....	....
Mouse	6.65	....	....	....	....	6.8	.....		...	....	....	....	....	....	...	....
Hog	6.00	....	6.0	6.0	....	5.95	.....	....	....	...	....	....	....	....	. .	....
Ox	5.95	....	5.95	5.6	....	6.02	.....	....	....	....	....	..	....	....	....	....
Cat	5.76	....	....	6.5	6.5	5.81	.....	..	....	..	....	....	..	....	....	....
Horse	5.52	....	5.52	5.6	....	5.99	.....	....	....	...	....	....	...	...	....	....
Sheep	4.79	5.0	4.8	5.0	5.0	5.17	.....	....	...	....	....	...	....	....	....	....
Goat	3.99	4.1	3.95	4.0	4.1	4.10	.....	....	...	...	....	....	...	....	....	....

* 1 micromillimetre = $\frac{1}{25400}$ English inch.

times from five individuals, measured by Dr. Woodward, each being the mean of about fifty measurements:

1. Dr. W., dry	(50),	7.72	micromillimetres.
" " moist	(49),	7.42	"
" " moist	(50),	7.62	"
" " moist	(50),	7.34	"
2. Dr. McC., dry	(50),	7.31	"
" " dry	(50),	7.47	"
" " moist	(50),	7.65	"
3. Mr. W., dry	(50),	7.57	"
" " dry	(52),	7.54	"
4. Mr. T., dry	(50),	7.37	"
" " dry	(50),	7.42	"
5. Mr. B., dry	(50),	7.52	"
" " dry	(50),	7.54	"

A similar difference exists in dogs of different breeds and individuals of the same breed. One mongrel terrier gave to Dr. Woolward a mean (54 measurements) of 7.59 micromillimetres—0.000299 English inches; another of the same breed 7.37 micromillimetres; while a Spitz dog only measured 7.24, and a Scotch terrier 7.39.



×2500.

If we consider, furthermore, that in some cases to be decided the blood may have been dried at first and then exposed to manifold influences of the changes of weather; or that clothing upon which the stains are found may have been in contact with soap and water and various detergents before it is brought to the expert for examination; that the dried stains must by various means be separated and prepared for microscopical examination; that by any such means the volume is liable to be changed—the feeling of confidence in the micrometric method of determination must certainly be somewhat shaken.

But when, in spite of all obstacles, the evidence points to the probability of the blood being human, a doubt still remains whether the stain has not been produced by *insects* (mosquitoes, bedbugs, etc.) *which had filled themselves with human blood.* For a series of observations—a short account of which I read before the Medico-Chirurgical Society, and which was published in 1880, and in whose execution I was kindly assisted by Dr. E. Evers—show that mosquitoes do not digest the human blood they have imbibed for at least forty-eight hours, and that, by crushing them, spots of considerable size are formed, in which the presence of unchanged human blood can be shown without great difficulty. Hence the high expectations which some authors lead us to entertain of micrometric auxiliaries in the discrimination of human blood must be reduced to a more modest limit, and we must remain satisfied that observation of the form elements can only establish the recognition of blood in a general way, and that only especially favorable conditions permit us to definitely recognize its source.

Besides the micrometric method we can command other means of proving the presence of blood, which are founded upon the recognition of its coloring ingredients. And in cases where from any cause the form and size of the cells are no longer capable of determination, these means are really the only ones at our disposal. Some of these methods even permit the proof of the presence or absence of some poisonous gases (carbon monoxide and hydrocyanic acid), which, being introduced by inhalation, produce changes in the coloring materials. For the better understanding of these methods it is necessary to briefly consider the chemical character of the *coloring matters of blood.*

They belong to the groups of crystallizable protein bodies, and consist principally of intimate combinations of albuminoids with the coloring material proper.

Oxyhæmoglobin, called also oxycruorin, or scarlet cruorin, according to Stokes, is found in the red corpuscles of the arterial blood of all vertebrata and of some of the lower animals (mollusks, rainworms, some larvæ of insects, etc.). It may be extracted from the red cells by adding common salt to defibrinated blood, and afterward mixing with ether and alcohol. On cooling to −5° C. crystals of oxyhæmoglobin are formed, which assume different shapes according to the species the blood was taken from. Most forms belong to the rhombic system, but crystals prepared from the blood of the squirrel and hamster are hexagonal, those from the guineapig and the rat are tetrahedral. It is somewhat difficult to obtain any crystals from the blood of the hog, the sheep, or the ox. The difference in form prompts us to believe that a different molecular structure may also exist, and this assumption derives still further support from the widely differing results of chemical analysis of oxyhæmoglobin crystals of different derivation. We appear justified in the belief that in these different crystals we have an identical coloring material, *hæmatin,* combined in various proportions with globulin and water of crystallization. The loosely combined oxygen of oxyhæmoglobin is that of the ordinary variety, and not ozone as has been assumed by some authors. On the other hand, oxyhæmoglobin has the property of easily transferring the ozone from compounds containing it to others, such as, for instance, from ozonized oil of turpentine or ether to tincture of guaiacum. In a vacuum oxyhæmoglobin easily yields up its loosely combined oxygen and is reduced to hæmoglobin, but on admission of air it rapidly recovers it again, so that at a low temperature 1 Gm. of hæmoglobin will readily absorb more than 1 Cc. of oxygen.

The crystals of oxyhæmoglobin are bright red in color and pleochromatic. In water they readily dissolve, but those of different derivations differ in degree of solubility. Chloroform, biliary acids, and ether are also capable of dissolving oxyhæmoglobin, while alcohol prevents its solution in water. The aqueous solution is of an intense red color, very little transparent while concentrated. A dilute solution shows in the spectroscope two characteristic absorption bands, which will be described further on.

Note.—Analysis of the oxyhæmoglobin crystals of various animals has given the following results:

	From Dog.	From Hog.	From Horse.
C	53.85 to 54.20 per cent.	54.17 per cent.	54.87 per cent.
H	7.32 " 7.20 "	7.38 "	6.97 "
N	16.17 " 16 00 "	16.23 "	17.31 "
S	0.39 " 0.70 "	0.66 "	0.39 "
Fe	0.43 " 0.42 "	0.43 "	0.43 "
O	21.84 " 21.48 "	21.13 "	20.03 "
	100.00 100.00	100.00	100.00

For oxyhæmoglobin from the horse Huefner has proposed the formula:

$$C_{555}H_{852}N_{149}S_2FeO_{149}+28H_2O$$

while Zinoffsky calculates:

$$C_{712}H_{1130}N_{214}S_3Fe_2O_{246}$$

Methæmoglobin is occasionally found in old extravasations, and may be obtained from oxyhæmoglobin by various agents. It appears to contain the same amount of oxygen in a state of *firm chemical combination*, instead of being *loosely bound* as it is in oxyhæmoglobin. It may be readily prepared from hæmoglobin by oxidation through the means of nitrites, permanganates, chlorates, and hypochlorites, or of iodine; also by treating an aqueous solution of oxyhæmoglobin with potassium ferricyanide (red prussiate). The latter, while rendering the combination of oxygen with the hæmoglobin so much firmer, expels other gases, such as carbon monoxide, which may be collected for examination.

Methæmoglobin crystallizes in fine brown needles, which dissolve in water, communicating to it a brown color, which is turned into red by alkalies. No oxygen can be extracted from it by the air pumps. In the spectroscope it shows four absorption bands.

Sulpho-methæmoglobin is prepared by passing hydrogen sulphide through an aqueous solution of oxyhæmoglobin. Its solution is of a dingy red color when concentrated, but becomes olive-green by dilution and furnishes a peculiar spectrum. It is the cause of the greenish coloration of putrid flesh.

When the loosely combined oxygen is removed from oxyhæmoglobin either by the air pump, or by passing hydrogen gas through its solution, or by means of other reducing agents, there is formed

Hæmoglobin (also known as hæmatoglobin, hæmatocrystallin, or, according to Stokes, as purple cruorin). By abstracting the oxygen from crystals of oxyhæmoglobin, it is obtained as an amorphous brown-red mass, which may be crystallized and forms violet-red hexagonal tables. They readily dissolve in water, and on exposure to air the solution rapidly absorbs oxygen and is converted into oxyhæmoglobin again. Other gases are in like manner absorbed, among them carbon dioxide (or carbonic acid gas), which, however, does not enter into a firm combination with it; while nitrogen dioxide, carbon monoxide, and ethylene gas form chemical compounds with it, of which the two first may be obtained in the shape of crystals.

Hæmoglobin, as well as its compounds, also shows characteristic absorption bands in the spectroscope.

By treatment with acids or alkalies or alcohol, or by simple heating, the albuminoid part of the hæmoglobin may be coagulated and separated, leaving the proper coloring material of blood. This is called

Hæmochromogen. It is capable of combining with oxygen and with carbon monoxide. In alkaline solution it absorbs oxygen from the air and is converted into *hæmatin*. (Some authors call this oxygen compound *oxyhæmatin*, while hæmochromogen is called *reduced hæmatin*, or simply *hæmatin*. This nomenclature is perfectly correct, but, unless universally accepted, might lead to mistakes.)

Acid solution of hæmochromogen absorbs oxygen much more slowly. A very characteristic spectrum is shown by this pigment.

Hæmochromogen, as well as its oxygen derivative, contains iron among its constituent elements. But when it is heated with concentrated sulphuric acid, another pigment is formed, called **Hæmatoporphyrin,** or cruentin, which is *free from iron*. Its color is dark violet. It is but sparingly soluble in water, but easily in alkalies, yielding a purple-red solution which shows a peculiar spectrum.

When oxyhæmoglobin is deprived of its albuminoid constituent by alkalies or acids, or when hæmochromogen is oxidized, there is formed

Hæmatin ($C_{32}H_{32}N_4FeO_4$), also called oxyhæmatin, and supposed by some authors to be identical with *hæminic acid*. While moist it shows dichroism, being brown-red by transmitted and greenish-brown by reflected light; on drying it assumes a shining bluish-black color. It is insoluble in water, alcohol, and diluted acids, somewhat soluble in strong hydrochloric and acetic acid. In alkaline liquids it readily dissolves with red color. Its compound with hydrochloric acid, *hæmatin hydrochlorate*, forms very characteristic crystals, generally known as *Teichmann's hæmin crystals*. Other compounds are easily prepared with ammonia, baryta, and several metals. In alkaline solution it is reduced by nascent hydrogen and converted into *urobilin*.

Many other derivatives of the blood pigments have been either prepared artificially or occur naturally, *e.g.*, *hæmatoïdin*, which is sometimes found in old extravasations; but the description given will suffice to explain the methods of identification of blood based upon the chemical and optical behavior of its constituents.

One of the simplest tests applicable to the distinction of blood (as well fresh as in older stains) from other red-colored liquids is the addition of diluted *ammonia water*. The color of the blood pigments remains nearly unchanged, while other red colors are considerably affected; thus cochineal turns deep violet, red wine green, litmus blue. Hence a decided change of color leads us to assume the absence of blood.

Another valuable reagent for the identification of blood is *tincture of guaiacum*. When this is brought together with blood and *ozonized* oil of turpentine or ether, an intense blue color is the result. But the experiment must be made with certain precautions. First, the tincture of guaiacum should be freshly prepared by digesting a small piece taken out of the centre of a larger lump of crude resin of guaiacum (or a chip of guaiacum wood) with enough alcohol to make a weak tincture. The *ozonized* ether or oil of turpentine is found in bottles which have been frequently opened, but may be made rapidly by shaking together about equal volumes of ether and hydrogen dioxide (peroxide) solution. A few drops of this are mixed with the guaiacum tincture and the mixture applied either to a stain made by the suspected liquid upon filter paper, or directly to a stain on linen; or else mixed in a test tube with a drop of the liquid obtained by diluting the suspected blood with water or of the washings derived from a dried stain. If a decided blue color is produced, blood *may* be present; yet it must not be forgotten that a few other things are capable, under like conditions, of communicating a blue color to guaiacum, among them leather and extract of malt, whose absence must be shown before the test can be accepted as conclusive for the presence of blood. In spite of these drawbacks the guaiacum test appears to be a favorite with many authors.

The presence of *iron* in blood and its derivatives has led to a method of recognizing the presence of blood by showing that of iron. The suspected substance is carefully incinerated, the residue dissolved in hydrochloric acid, and the presence of iron demonstrated by the Prussian blue produced on the addition of potassium ferrocyanide. The method has only a negative value—*no iron, no blood;* while the reverse, the presence of iron, is not conclusive evidence of that of blood.

A much more reliable method, which is applicable even to very small and old stains, was discovered in 1853 by *Teichmann*, who taught us to prepare from even small traces of blood the characteristic "hæmin crystals." (See p. 71.) They consist of hæmatin hydrochlorate, and can be easily prepared and distinguished from other bodies. The preparation I here show you under the microscope, under magnifying powers up to 300 diameters, are derived from various sources—from fresh blood of the hog, of the ox, and of man, also from old dried stains. One is from a small drop of hog's blood which I had placed, many years ago, upon a slide for the purpose of measuring the size of the red cells. Neither in shape nor in color can there be made out any difference between the crystals derived from these various sources. Some differ, according to the rapidity of cooling, etc., in size, but all present the same characteristic features. The contours of the larger ones are somewhat curved, those of the smaller somewhat more rectilinear, but every slide shows you the same forms. The smaller crystals are long prisms of clinorhombic habitus (not rhombic, as some authors state); the larger ones are broader in proportion and somewhat approach the rhombic form. The curvature of the sides renders it difficult to measure the angles, but I have found in most cases that the acute angle does not deviate much from 55°. Frequently the crystals cross each other and form beautiful rosettes. The color varies, according to thickness, from brownish-yellow to brownish-black.

To obtain these crystals, fresh blood, or the stain separated from its base, is heated for a few minutes with glacial acetic acid and a trace of sodium chloride, and the liquid rapidly filtered. On cooling, the liquid soon becomes turbid and deposits a fine black powder, which is then transferred to the slide for examination. For permanent mounting glycerin jelly is very suitable. There are other methods practicable for the preparation of these crystals, some of which employ oxalic acid, alcohol, and calcium chloride. By means of these, crystals of somewhat different form may be obtained, varying according to the rapidity of separating, but still of the same characteristic habitus. From a small blood stain a small fragment may be transferred to a slide and the crystals prepared directly upon it. To the fragment a trace of sodium chloride is added, the cover glass is applied, and a drop of glacial acetic acid permitted to flow beneath it. The slide is heated carefully over a small flame and then permitted to cool slowly. From a single milligramme of blood many crystals may be thus obtained, which can be readily identified.

It is true that even in this method some fallacies may be encountered by careless removal of the stain, permitting it to mix with crystallizable foreign substance, etc., but *with proper care the Teichmann method is one of the most reliable for recognizing traces of blood.*

If the blood to be examined has been exposed for some time to the destroying agencies of putrefaction, its pigment may have been so completely disintegrated as to permit of no possibility of recognition; but whenever even a small rest has escaped decomposition, the *hæmin crystals* may be prepared from it. Stains on rusty iron yield the reaction with difficulty and are best examined with the spectroscope.

Spectroscopic examination not only serves to supplement and give additional weight to the evidence obtained by other methods for the identification of blood, but enables us to detect its presence in some cases where other means fail, and in addition serves to show the presence of *carbon monoxide* and of *hydrocyanic acid* much more easily and with greater certainty than in any other way.

The instruments best suited to such investigation of blood, and of colored liquids generally, are the smaller kind with only moderate dispersion, and especially those with arrangements for introducing two spectra at once for comparison. A larger instrument with high dispersive power does not permit so good a definition of the margins of the absorption bands. The instruments we use here are a better class of *Vogel's* pocket spectroscopes with mirror and prism for comparison. The liquid is placed into test tubes of thin glass of 1 Cm. in diameter, and descriptions of spectra of certain concentrations are referred to strata of that thickness.

When only a very small quantity of the liquid is at our disposition we have recourse to the use of the **Microspectroscope,** an instrument used instead of the ordinary ocular of any good microscope, which was first manufactured by *Browning* according to the directions of *Stokes*, and which has since been offered by opticians in various modifications.

The instrument we use here is the *Zeiss model* as furnished by *F. Schmidt* and *Haensch.* The liquid is placed either in a wedge-shaped cell, or a slide with concave recess, or in other suitable containers. As long as blood retains its red corpuscles intact it is opaque, even in very thin layers. But when water or some other liquids are added, the circular discs imbibe the fluid, swell into spheres of somewhat smaller diameter, and finally burst. Even before they are thus destroyed their contents pass into the liquid by diffusion and render it more transparent (lake-colored) by a solution of the oxyhæmoglobin.

A mixture of equal parts of blood and water, containing about 7.4 per cent of *oxyhæmoglobin*, does not permit any light to be seen through it with the spectroscope. With about twice as much water a narrow streak of light appears in the red part of the spectrum, near the Fraunhoffer line, C. (See p. 72.) With progressive dilution this widens, and a green streak gradually lights up the space between C and F, so that, with about twentyfold dilution of blood (0.75 per cent of oxyhæmoglobin; see plate, No. 1), the two light spaces are separated by a dark band, which covers the D (sodium) line and extends to C (of wave length 594 to 516 millionths of millimetres). The violet end of the spectrum is darkened from wave length 600 (between C and F), and the red end from 710, near the B line.

When blood is diluted with water to about 40 volumes (containing about 0.37 per cent of oxyhæmoglobin), the light spaces become enlarged and the dark band is divided into two parts, the darker reaching from 589 (D) to 565, the other from 550 to 524 millionths of millimetres wave length (No. 2 of the plate). At a dilution to 400 volumes (0.04 per cent of oxyhæmoglobin) blood shows the spectrum No. 3, in which both bands have become less shaded and the light extends further toward the violet end. With sixteen-hundred-fold dilution (0.01 per cent of oxyhæmoglobin) only a single thin and faint band remains between 573 and 583 (No. 4 of the plate), and this finally vanishes with still greater dilution.

If the oxygen is removed from the blood by the air pump or by reducing agents, the spectrum of *hæmoglobin* is shown, with a single, broad band from 535 to 595 (No. 5 of the plate), when there is fortyfold dilution of the blood. In the tube before the spectroscope the blood has been reduced by ferrous ammonium tartrate. Shaking with air restores the oxyhæmoglobin and shows its characteristic double band.

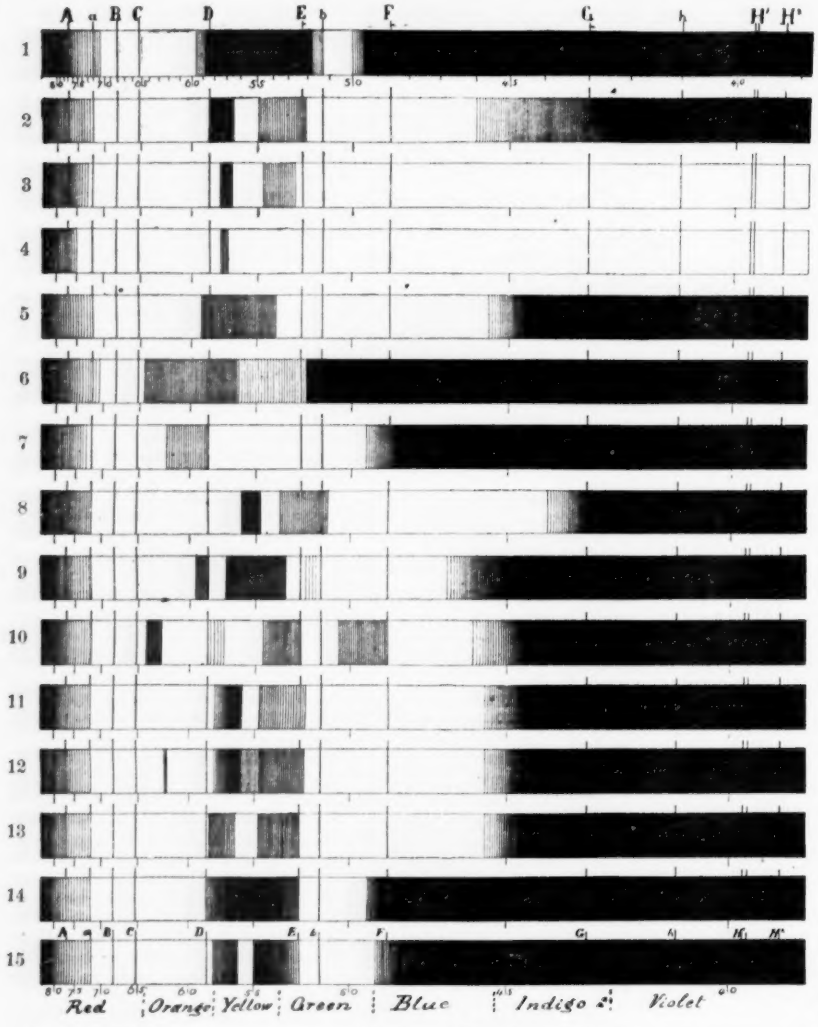
If blood be mixed with about twice its volume of concentrated potassa solution, a viscous mass of greenish-brown color is formed, which becomes brown-red on contact with air. On dilution with water the solution shows the spectrum of oxyhæmatin, whose two bands vary in width according to concentration. They are represented in Nos. 6 and 7 of the plate. In concentrated solution the broader extends from 645 to 560, in dilution only from 620 to 589 (D); the other is very feeble. If the dilution of the greenish-brown mass is made without permitting access of oxygen, or if the oxygen be removed by reducents, the spectrum of *hæmochromogen*, or *reduced hæmatin*, is shown, as first demonstrated by Stokes (No. 8). Through the instrument you will see a narrow but very dark band (547 to 546) and a much paler but broader one (515 to 530).

When blood is heated with concentrated sulphuric acid, not only the globulin but the iron is removed from the pigment, and *sulphate of cruentin*, or *hæmatoporphyrin*, is formed (No. 9), which shows three absorption bands—a narrow one from 600 to 589 (D), another from 587 to 540, and a very faint one between E and C at 520,

Methæmoglobin (No. 10), which shows four bands between C and F.

Poisoning by inhalation of carbon monoxide gas (carbonic oxide) converts the oxyhæmoglobin into *CO Hæmoglobin.* Blood containing this shows a much brighter red color than normal blood, which is preserved even after putrefaction has begun, and is especially noticeable in the foam formed by shaking. In fortyfold dilution the spectrum of *carbon monoxide blood* shows two bands, similar to those of oxyhæmoglobin, but situated somewhat more towards the violet end of the spectrum, so that the interval between the first band and the D line is more distinctly marked. This band reaches from 584.5 to 562, the second from 549.5 to beyond E (No. 11). But although the difference may be ascertained readily by measurement, it is still more easily shown by the action of reagents. If oxyhæmoglobin is reduced by ferrous ammonium tartrate, hæmoglobin is formed with a spectrum of a single band. Treatment of CO hæmoglobin with the same reagent does not change its double-banded spectrum. If yellow sulphide of ammonium is employed as the reducing agent, the same result is reached, but a narrow band is added at 620, the spectrum of sulpho-methæmoglobin. If, besides the CO hæmoglobin, unchanged blood is still present, then a mixed spectrum becomes visible (No. 12).

Jaederholm has taught us to obtain still further confirmation of the presence of carbon monoxide in blood by converting it into *CO hæmatin.* A double volume of very concentrated solution of soda is mixed with the blood, which converts it into a tough mass. If this be spread into a thin layer on a porcelain plate, normal blood will show a greenish brown color, which gradually changes to red-brown by oxidation. Carbon monoxide blood shows a bright-red color at once, which remains unchanged by contact with air. After solution in water, normal blood shows at first the spectrum (No. 8) of reduced hæmatin (No. 7). CO blood solution, on the other hand, shows the spectrum of CO hæmatin (No. 13), very similar to that of oxyhæmoglobin and CO hæmoglobin. If blood is but partially converted into a CO compound, mixed spectra are observed.



1. Oxyhæmoglobin 0.75%
2. " 0.37%
3. " 0.01%
4. " 0.01%
5. Hæmoglobin 0.37%
6. Oxyhæmatin conc.
7. " diluted.
8. Hæmochromogen.
9. Hæmatoporphyrin.
10. Methæmoglobin.
11. CO Hæmoglobin.
12. " mixed with unchanged blood and Sulpho-Methæmoglobin.
13. CO Hæmatin.
14. HCN Oxyhæmoglobin.
15. HCN Hæmoglobin.

Poisoning by hydrocyanic acid, especially by inhalation of its vapor, may be recognized by the spectra of HCN oxyhæmoglobin with one band (No. 14); and after reduction of HCN oxyhæmoglobin (No. 15), with a double band. Great care must be exercised to avoid mistaking similar spectra of other coloring materials for those of blood. This is especially necessary if the stains are found on fabrics colored with cochineal, with indigo, brazil wood, etc. These must be rigidly excluded by observing their different behavior with various reagents, and by accurate measurement of the spectral bands.

Altogether, such investigations require much practical experience and cannot be safely entrusted to the amateur.

Terpin Hydrate from Oil of Eucalyptus.

As is well known, terpin hydrate is prepared by allowing oil of turpentine to remain in contact with nitric acid and alcohol at the ordinary temperature, and recrystallizing the crystals obtained in this manner from alcohol.

E. Merck, of Darmstadt (in his Annual Report for 1892), states that terpin hydrate may in similar manner be prepared from oil of eucalyptus (either oil of *Eucalyptus globulus* or the commercial Australian eucalyptus oil). The terpin hydrate obtained from this source crystallizes from aqueous alcohol in large, finely formed, glass-like crystals, having the same melting point (115° to 116°) as the ordinary terpin hydrate, and is shown to be identical with it by its ultimate composition and other properties.

The question, to which constituent of oil of eucalyptus the terpin hydrate owed its origin, is answered by the fact that the oil contains pinene, which has been shown by Wallach to yield terpin hydrate.

Chloroform Water in Diphtheria.—Chloroform water has recently been used with reputed success as a gargle in diphtheria. Prof. Loeffler, the discoverer of the diphtheria bacillus, recommends a cold-saturated solution of chloroform in water.—After *Rundschau* (Prag).

Estimation of Fat in Milk.

THE following method of estimating fat in milk is given by Lezé and Allard. It is a modification of Smith's hydrochloric acid method. In principle it is as follows:

Into a flask specially made for this purpose introduce a quantity of milk, together with four or five times its volume of pure and concentrated hydrochloric acid. The casein is at first precipitated, and then redissolves in the excess of acid; the fat separates and collects in oily drops on the surface of the liquid. The acid is then saturated by ammonia diluted with half its volume of water, and enough warm water is then added to cause the whole of the fat to ascend into the neck of the flask.

This neck, narrow and long, is divided into cubic centimetres and tenths. The flask is kept during some time in an oven heated at 40° C. (104° F.), and the volume of fat is read off directly at the scale.

The number of centimetres multiplied by the specific gravity of the fat at 40° C. gives the weight of butter in 1 L. of milk.

The temperature of 40° C. is chosen, as the butter at this temperature is melted and homogeneous. Its specific gravity is then 0.900.

The separation of the fat always takes place more readily if the hydrochloric acid is made to act upon the milk for several hours, either at the ordinary temperature or between 25° and 30° C. Casein is only slowly acted upon, and a too rapid heating of the freshly prepared mixture is apt to cause an imperfect separation of fat.

The hydrochloric acid must be absolutely free from uncombined chlorine; otherwise there is produced a flocculent precipitate, and a gas which renders the reading off of the fatty column very difficult.

Saturation with ammonia may be omitted, in which case smaller flasks may be employed.

This method of determination of fats may be applied to many other substances besides milk—for instance, cream, cheese, etc., and also margarins.

In such cases the execution is very simple. Into one of the flasks with graduated neck a known quantity of the material to be analyzed is introduced, together with four or five times its volume of pure hydrochloric acid. The reaction is allowed to proceed at a moderate temperature during some time, the flask being occasionally gently shaken. The material gradually disappears, and there will finally be left a mixture which becomes brown by heat. A clear liquid portion separates, and also the fat. On now adding hot water the latter is made to rise into the neck of the flask.

In case the material to be examined is too tenacious to be easily introduced into the flask, it may be decomposed in a capsule, and the contents of the latter subsequently transferred to the flask.

To show the reliability of the method the authors quote the following parallel analyses of Gruyère cheese:

(Water.....	28.20)
Fat, determined by ether.....	31.84
Fat, determined by carbon disulphide.....	32.04
Fat, determined by the above process.....	31.75

—After *Journ. de Pharm.*, 1891, 538.

Ancient Use of Hellebore.

THE *Gardener's Chronicle* gives some interesting information about some of the ancient therapeutic uses of hellebore. As far back as the days of the Roman poet Horace we find this drug used on account of its beneficial effect in certain cerebral disorders. To certain places where this plant was produced patients afflicted with epilepsy were wont to go and undergo a course of treatment. Pliny tells us of an ancient philosopher, Curneades, who, before making a public declamation against the teachings of the Stoics, underwent a course of hellebore treatment at one of these resorts. Also, Drusus, a popular leader of the Romans, was cured there of epilepsy. The same writer states that the drug at last became so extensively known and used that it became a favorite stand-by among students to sharpen their wits while puzzling out some intricate problem.

THE WALKING CANE AS MEDICINE CASE.

A BERLIN firm (A. Tonger's Versandgeschäft) has put on the market bamboo walking canes containing in their upper, hollow part small vials, etc., containing various remedies for emergencies for travellers, tourists, etc. The annexed cut shows the external appearance and the internal arrangement of the cane. The articles which are mentioned as contained therein are: adhesive plaster, needles, styptic cotton, Hoffmann's anodyne, tincture of arnica, tincture of valerian, water of ammonia, and vaseline. The editor of the *Chemiker Zeitung*, from which we take the item, suggests that the interior be divided into compartments, each to contain one of the vials, so that the latter may not be broken. 3032]

Walking Stick Medicine Case.

More Wonders of Electricity.

ASTONISHING experiments have been shown, in the beginning of February of this year, at the Royal Institution, by Mr. Nikola Tesla, a young electrician from America. Mr. Tesla first became famous as the inventor of the first alternate-current electric motor—that is to say, a motor which transforms currents, rapidly changing their direction to and fro, into mechanical power. He has proceeded with his studies in high frequency currents—that is, in the rapid change of direction—and now he exhibits a specially devised alternating-current dynamo carrying nearly 400 electromagnets, driven at some 2,000 revolutions per minute, and supplying a current alternating 20,000 times or more per second. With this he realizes the idea of many electricians, of producing electric light in a vacuum tube without the intervention of any filament. By joining to the poles of his generator two sheets of tinfoil, one over his head and the other on the table, the space between immediately became electrified, and a long vacuum tube waved about in it, without any attachment to any conductor whatever, glowed in the darkness like a flaming sword. This experiment was intended to illustrate the possibility of rendering an entire room so electric by plates in the ceiling or under the floor that vacuum bulbs placed anywhere within it would yield a light. Still more wonderful is the fact that currents of these extremely high potentials appear to be absolutely without effect upon the human organism. Taking an iron bar in one hand and a vacuum tube in the other, the lecturer made his body a portion of the circuit by placing the point of a bar upon a terminal, emitting sparks several inches long. The vacuum tube glowed brilliantly, while the lecturer remained wholly unaffected. If the force had been one five-hundredth of what it was it would probably have killed him instantly.—*Chem. and Drugg.*

Permanent Fehling's Solution.

THE proposition to employ glycerin as a preservative of Fehling's solution is not new. Rossel, however, has recently gone a step further than his predecessors, and recommends (in *Schweiz. Wochensch. f. Pharm.*, 1891, 442) to omit the tartaric acid altogether and to employ glycerin instead. He directs the following proportions:

Dissolve 34.56 Gm. of pure crystallized sulphate of copper in distilled water, add 150 Gm. of pure glycerin, then 130 Gm. of pure caustic potassa previously dissolved in water, and finally enough water to make 1,000 Cc. Each cubic centimetre of this solution corresponds to 0.005 Gm. of glucose. If both the glycerin and the potassa were pure, the solution is said to keep indefinitely.

Varieties of Kola Nuts.

As a supplement to the note on kola nuts printed on page 5 of the current volume, we quote here a passage from "Dr. W. Junker's Reisen in Afrika" (vol. iii., 138) which throws additional light on the subject.

The kola nut, which is a highly-prized article in Western Africa, and, when genuine, quite expensive, is also occasionally chewed by the Mangbattu and Niam-niam races. (These occupy the territories comprised between about 27° and 30° long. and 3° to 5° north lat.) But the custom seems to be confined to the chiefs. In Western Sudan the term *kola* is applied to several varieties. The most esteemed one is *Cola acuminata* Rob. Brown; but the most common one is *Cola cordifolia* Cav., which is a chief component of the dense forest "galleries" so commonly overtopping the upper branches of the affluents of the Congo. The tree rises, without branches, to a height of 80 to 100 feet, and bears gigantic cordate, sometimes three- or five-parted leaves on long stems. The fruit is usually compound, containing divisions (10 to 12 Cm. long) with 8 to 10 kernels. The latter closely resemble the true kola, but are only of half its size, and have a blood-red color inside, while the true kola is rose-red. Dr. Junker mentions also another kind of kola which he saw eaten among the Mangbattu, but the origin of which he could not ascertain. Its rose-red tint resembled that of the true kola, but it had a bitter taste. In Western Africa a bitter variety of kola is known, but this is not derived from a member of the genus *Cola* (nat. ord. Sterculiaceæ), but from *Garcinia Cola* Heckel (nat. ord. Guttiferæ).

The occurrence of the true kola in the country of the Mangbattu is proven by the fact that Dr. Schweinfurth encountered it on his travels through that region.

Ipoh [Upas] and other Arrow Poisons used by the Malays of Perak.

THE following is taken from a letter of Mr. L. Wray, Jr., published in the Kew *Bulletin* of October and November, 1891:

There are two tribes of aborigines in Perak who use arrow poison, viz., the Semangs and the Sakais. The former people, who live in the north of Perak, use both blowpipes and bows and arrows, while the latter, who live in the southern part of the State, use blowpipes only.

I recently visited the Ula Selama, where some of the Semangs live, and was taken by them to a place called Kuala Jah, at, I should estimate, 500 feet elevation, where I was shown, growing in the virgin forest within 100 yards of one another, two large ipoh trees, the larger full 100 feet in height to the first branch. It had been tapped many times, the bark being deeply scored up to a height of 25 feet from the ground. The smaller tree was also scored all over. The bark externally is white, and internally orange-brown, and is very thick and fibrous. On cutting fresh scores into the bark the dirty, whitey-brown sap ran very sparingly out, and was conducted, down palm leaves stuck on the trunk of the tree with clay, into bamboos. The scores are cut slanting, alternately right and left, like what is known as herring-bone stitching, with the lower ends of the scores pointing inward. At the bottom of each series of scores is put a leaf, fastened to the bark with clay, to lead the sap which trickles down into a bamboo. We only succeeded in getting about 3 ounces of sap the first day; but two days afterward, by erecting a scaffolding around the tree and extending the scores up the trunk, we got about 1 pint. Three ounces of sap, the Semangs said, was enough to poison 100 blowpipe arrows.

The sap having been collected from the trees, a spatula-shaped piece of wood was taken and heated over a clear wood fire, and a small quantity of the sap poured on it and spread out with another but smaller wooden spatula, and held over the fire till nearly dry, and the process repeated till all the sap evaporated. There remained on the spatula a dark-brown, gummy substance, on which the points of the arrows were rubbed three times, being dried over the fire between each application of the poison. This simple process completed the preparation of the poison; but as there are sometimes other things mixed with the ipoh, I shall return to this part of the subject again.

The sap, which I found to be bitter and biting in taste and decidedly acid to test paper, on exposure to the air quickly darkens to a brown color, and it yields when dried on a water bath 29 per cent of solid ipoh. This substance, if put thinly on a slip of glass and examined by a microscope, is seen to contain numerous crystals of antiarine.

A portion of the sap was mixed while fresh with its bulk of alcohol, to prevent its decomposition, and corked up, samples of which are forwarded to the director of the Royal Garden, Kew, with this paper. I also obtained leaves from the larger of the two trees, and the dried poison on the spatula, as well as the leaves of a young ipoh tree. These latter are decidedly pubescent, while those from the large trees are glabrous. There were neither fruit nor flowers on the trees, but I sent to Kew fruiting specimens of the ipoh in 1883, which were pronounced by the present director of the Gardens to be identical with the Javan specimens of *Antiaris toxicaria* in the Kew herbarium. The trunk of the tree from which these specimens were obtained was also much scored, showing that its sap had been collected by the aborigines. Specimens of this tree were also communicated to Dr. G. King at the Botanical Gardens, Calcutta, who identified it as *A. innoxia*.

It may be mentioned in reference to the two kinds of upas distinguished by Blume as *Arbor toxicaria femina* and *mas*, that the latter word, which is Malay, means "gold," and not "male" as inferred in the former paper. It is so called from the golden color of the inner bark, and by this they distinguish the poisonous from the non-poisonous trees.

From some of the sap collected in Ula Selama I have separated the poisonous principle, antiarine, a small tube of which, containing 4.6 gr., being the amount obtained from 1 fluidounce of the sap, accompanies the other specimens.

The process I employed to isolate the alkaloid was briefly as follows: Evaporate to dryness on a water bath the mixed sap and spirits of wine, add water, heat, filter, wash filter with hot water, evaporate filtrate and washings to a syrup, and allow the antiarine to crystallize; purify by recrystallization. The antiarine appears as minute diamond-shaped crystals, many of which have the obtuse angles replaced.

The so-called antiar-resin, when separated from the fresh sap, is nearly white and much resembles caoutchouc, though it doubtless assumes a resinous appearance on long exposure to the air. One fluidounce of the sap yielded 17.5 gr. of antiar-resin.

By Watt's method of separation just detailed it is only possible to isolate a portion of the antiarine contained in the fresh sap, owing to the large amount of extractive matter present in the solution, and I found it necessary to modify the process by precipitating the extractive matter by acetate of lead, filtering, precipitating any excess of lead with sulphuric acid, neutralizing the free acid with carbonate of lime, filtering (which should be colorless) on a water bath till the antiarine crystallizes out, then freeing the crystalline mass from any sulphate of lime which may be present by dissolving it in spirits of wine or ether and recrystallizing the now pure antiarine.

One fluidounce of the ipoh sap I found to yield, when so treated, 10.85 gr. of antiarine, or 2.482 per cent. The dried ipoh poison, of which the sap contains 29 per cent, therefore has 8.651 per cent of antiarine in it, separable by the above process.

With the imperfect laboratory appliances at my disposal, these results cannot be considered as more than estimates of the total amount present, and unfortunately I have no analysis of upas with which to compare them.

As the result of weighing coated darts and washing off the poison, and the reweighing, the amount of ipoh on them may be taken to be rather less than 1 gr., and by the estimate above given this weight of the dried poison would only contain 0.086 gr. of the alkaloid, which, however, is sufficient to produce a fatal result when introduced into the circulation of an animal weighing as much as 20 pounds.

Manufacture of Synthetic Urea.

UREA has formerly been prepared on the large scale chiefly by the old method discovered by Woehler, viz., fusing anhydrous ferrocyanide of potassium with dry carbonate of potassium, adding minium (red lead), pouring off the melted mass from the sediment, and digesting it with ammonium sulphate. The urea thus formed is then extracted with alcohol.

A more advantageous process is, however, preferred at the present time. It depends upon the fact that when ammoniacal gas is passed through a solution of diphenyl-carbonate, phenol is separated and amidogen, NH_2, takes the place of the displaced nucleus:

$$CO\begin{cases}OC_6H_5\\OC_6H_5\end{cases} + 2NH_3 = CO\begin{cases}NH_2\\NH_2\end{cases} + 2C_6H_5HO$$

diphenyl-carbonate — ammonia — urea — phenol

The process is carried on as follows:

Any suitable quantity of phenol or carbolic acid is dissolved in an equivalent quantity of a dilute solution of soda—94 parts of phenol require 57 parts of caustic soda, NaHO. Through this solution phosgene gas or carbonyl chloride ($COCl_2$) is passed, whereby the phenol is converted into diphenyl-carbonate:

$$2(C_6H_5OH) + COCl_2 = CO\begin{cases}OC_6H_5\\OC_6H_5\end{cases} + 2HCl$$

phenol — phosgene gas — diphenyl-carbonate — hydrochloric acid

This (a solid crystalline substance) is filtered off and washed with water. It is then melted on a water bath and a strong current of dry ammoniacal gas conducted through it. As soon as no more ammonia is absorbed, which is perceptible by the odor, the whole mass is poured into hot water. On cooling there will be found two layers—a darker one, containing the phenol, and an aqueous, less colored one, of urea. The latter is removed and concentrated, when urea will crystallize out. This is then treated with alcohol until it is pure and colorless.

This process is used by a prominent manufacturer in Berlin, who has special facilities for executing it.

Five parts of diphenyl-carbonate yield 1 part of urea.

The Eucalyptus in California.

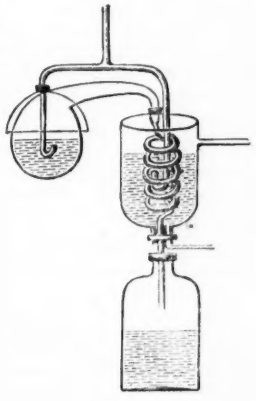
EUCALYPTUS oil is the centre of the commercial drug interest at present. Thanks to influenza and the Royal Insurance Company's blotting pads, there has been such a rush upon it that stocks, both new and old, have been cleared out, and the oil has got such a fillip with the public [in England?] that it is highly probable that in the future it will remain a regular domestic remedy, as it has become in Australia. It is rather an interesting fact that, as the reputation of eucalyptus oil has grown in the medical profession, other sources of supply than Australia have been discovered, and even in Australia the distilling industry is no longer confined to Victoria—all the colonies are now sending supplies to this country [England]. One point we have noted in this connection is the differences which there are between oils from the same species, and this is a matter which might be worthy of closer attention on the part of investigators. Considerable quantities of oil are distilled in the south of France, and from California 20,000 pounds of oil of *Eucalyptus globulus* are now exported yearly. The growth of the eucalyptus in California is another example of how rapidly new industries are developed in the far West. We have had an interview with Mr. Joseph McGillivray, manager of the Downie Boiler Incrustation Prevention Company, and from him have obtained some interesting particulars on the subject. It seems that the first to plant the eucalyptus in California was General Stratton, of Alameda County, who in 1869 planted 55 acres of hill land at the back of the town of Haywards with *Eucalyptus globulus* seedlings. There was considerable lack of timber in the district, and the object was to supply that and to better the climatic conditions. General Stratton's example was followed by others, for it proved an investment yielding a profit of $17.50 per acre per annum, and much more was obtained as experience grew. A large forest was planted 7 miles south of Los Angeles, and at the present time the eucalyptus is found over a tract of 400 miles along the California coast, it being cultivated in fields of 100 acres and under. The trees grow rapidly and form a splendid shelter. They are chiefly of the *globulus* species, but there are also some *Eucalyptus rostrata* trees which are cultivated for their timber.

It was in Alameda County that Mr. George Downie, a Fifeshire man, and cousin of Mr. McGillivray, discovered by accident in 1883 that a decoction of eucalyptus leaves removed the scales from boilers. He set about putting a preparation on the market, and succeeded in this. Meanwhile he found that in superintending the manufacture of the boiler fluid he had lost an asthmatic affection from which he had suffered for years. Mr. McGillivray was associated with him, and he was cured of bronchitis. They had noticed the pleasant odor which came from the boilers, but they were unaware that the leaves contained a volatile body until Mr. George McGillivray, home for a college vacation, told them what a valuable oil they were wasting. Means were at once taken to collect it, and that, with the boiler fluid, was the beginning of a very respectable industry, which was ultimately taken over by the company.

The factory is situated at the San Lorenzo Station, on the Southern Pacific Railway, and the supply of leaves is obtained from General Stratton's forest, as well as from plantations farmed by the company. The trees are cut down and the leaves gathered by gangs of men called "strippers." From 10 to 12 tons of leaves are operated upon daily, these yielding 1,500 gallons of boiler fluid and 70 pounds of essential oil. The oil is thus a by-product, and during the past two years it has become so important a part of the industry that the company have appointed a skilled chemist, under whose instructions the purity of the distillate has been greatly improved. The oil as closely resembles the Australian *Eucalyptus globulus* oil which Mr. Bosito showed at the Paris Exhibition, 1867, as any we have met with. It is rich in eucalyptol, and it is noteworthy that the Downie Company manufacture eucalyptol from the freshly distilled oil, thus insuring a freedom from oxidation otherwise unobtainable.—*Chem. and Drugg.*

A SIMPLE CONTINUOUS STILL.

A CONTINUOUS distilling apparatus for water has been devised by A. von Kaleczinsky which is entirely made of glass (see the illustration).



If the air be exhausted from the T-tube and the tube completely filled with water, the level of the water in the retort and the condenser will constantly remain the same. In proportion as water is distilled off from the retort by the application of heat, fresh water will take its place. Should air enter the T-tube it must be removed. To prevent the entrance of air as much as possible, the lower ends of the T-tube are turned upward. It is advisable to guard the retort (as shown in the cut) against loss of heat by radiation.—*Chem. Zeit.*, 1892, No. 1. 3027]

Conversion of Gallic and Tannic Acids into Benzoic Acid.—When a warm solution of gallic acid is added to a warm mixture of zinc powder and ammonia solution, the gallic acid is completely converted into benzoic acid after heating for some hours at 60° C. A similar result is obtained by heating gallic acid with zinc and dilute sulphuric acid, except that in this case the benzoic acid remains undisolved. Under similar conditions tannin is first converted into gallic acid and finally into benzoic acid.—C. E. GUIGNET in *Compt. Rend.* and *J. Chem. Soc.*

The Assay of Ipecac.

THERE has been some discussion in regard to the various methods of assaying ipecac root, and, in particular, the method suggested by Flückiger has been rather frequently criticised. It is stated in Lyons' "Manual of Pharmaceutical Assaying" (p. 110) that "either he (Flückiger) operated upon a poor drug, or the solvent used does not extract all of the alkaloid." While working with Prof. Flückiger last winter, the writer, at his instigation, took up the assay of ipecac root among other things, and determined to see if the method did really give so much less than any other. We used as our menstruum chloroform which had previously been saturated with gaseous ammonia, and extracted the finely powdered drug in an extraction apparatus, using a small safety tube attached to the upper open end of the inverted condenser, whose neck was filled with mercury to prevent as much as possible the escape of the ammonia. Several experiments with different samples of ipecac root yielded not more than 1.1 per cent of emetine. This left the question as to whether the drug or method was at fault still an open one. It remained so until, after returning to this country, the writer again took up the subject. Four different samples of ipecac root were all powdered to the same degree of fineness, and each subjected to assay according to three different methods. Those chosen were the gravimetric methods of Flückiger* and Lyons,† and the volumetric method of Dragendorff.‡ The most expeditious method of all three is that of Flückiger, for several assays can be made and completed in one day, while that is impossible in the case of Lyons' or Dragendorff's method. Dragendorff's method, inasmuch as it depends upon the use of mercurio-potassium iodide (Mayer's solution), without any definite end reaction, is not to be recommended unless all other methods fail. The result of the experiments is given in the following table:

	Dragendorff.	Flückiger.	Lyons.
Ipecac Root A	2.4 per cent	2.32 per cent	2.95 per cent
" " B	2.2 "	2.18 "	2.60 "
" " C	2.3 "	2.21 "	2.80 "
" " D	1.97 "	2.10 "	2.40 "

These figures show several things very clearly; most prominent the fact that the cause of the low results obtained according to Flückiger's process, by himself and the writer while working in the laboratory, lay not in the method but in the drug used, and that the method is capable of yielding results almost as high as any other. They also show that the method of Lyons is to be preferred to any other of the three methods used, especially as the emetine obtained by its use was as pure as any obtained by either process. The method of Dragendorff gives about the same result as that of Flückiger, and is undoubtedly less laborious, although not as expeditious. The end reaction in this process is perhaps, with the possible exception of strychnine, more readily determined in case of ipecac than in case of any other drug. However, of the three methods, the writer should not hesitate to use that of Lyons on all occasions, except when very busy and not in an especial hurry. For the sake of completeness the method of Lyons as used by the writer will be given in full.

Ten grammes of ipecac root in No. 30 powder, or finer, are set aside for fifteen hours after having been thoroughly shaken in a 250-Cc. Florence flask with 100 Cc. of Prollius' fluid.§ Connect with a condenser and distil off the ether on a water bath. Add a little ether to redissolve oily matter and then about 5 Cc. of water containing about ½ Cc. of five-per-cent sulphuric acid. Shake well, and set the flask on a water bath to evaporate off all the ether. Filter the remaining liquid, which must no longer smell of ether, through a small filter into a small separating funnel and wash both flasks and filter with water. Return filter paper to flask and again treat with ether as before, adding a little more sulphuric acid. Filter again. Continue this until a drop of the acid solution does not render Mayer's solution turbid. Add 10 Cc. of ether to the solution in the separating funnel, close tightly, and shake. Separate the ether and put it into the waste ether bottle. Now render alkaline with ammonia and shake out the alkaloids with a mixture consisting of 3 parts of ether and 1 part of chloroform, using about 15 Cc. of the latter mixture at a time, and continuing until the alkaline solution no longer becomes turbid when treated with Mayer's solution. Evaporate the combined chloroform-ether solution to dryness at a moderate heat, finally heating to constant weight at 100° C. in a glass evaporating dish. The weight of emetine found, when multiplied by 20, gives the percentage of emetine in the drug under assay.—ALFRED DOHME in the *Pharm. Review*, January, 1892.

* Pharmaceut. Zeitung, January, 1886.
† Lyons' "Manual of Pharmaceut. Assaying," p. 20, § 29.
‡ Amer. Journ. Pharmacy, November, 1885, p. 530.
§ Prollius' fluid consists of conc. ether 325 Cc., alcohol 25 Cc., conc. ammonia 10 Cc.

Frangulin.

T. E. THORPE and A. K. MILLER have continued their investigation of this constituent of the bark of Rhamnus Frangula, and have arrived at the conclusion that its composition is represented by the formula $C_{21}H_{20}O_9$, first assigned to it by Schwabe (*Arch. Pharm.*, ccxxvi., 569). It was found scarcely possible to determine the composition with certainty by analysis alone, for though it is easy to obtain a product that is distinctly crystalline and apparently pure, no definite test has been found by which its purity can be proved. The determination of the formula of frangulin has therefore been based partly upon an examination of the products of hydrolysis. By treatment with a mixture of dilute mineral acid and alcohol, frangulin is gradually converted into a clear reddish-brown solution. On evaporating off the alcohol a product (emodin) insoluble in water was obtained, the amount of which was as nearly equal to what should be obtained, on the assumption that the formula of emodin is $C_{15}H_{10}O_5$, as could be expected in an operation of the kind. The soluble product of hydrolysis was a dextro-rotatory fermentable sugar that was concluded to be rhamnose, $C_6H_{12}O_5$.—*Journ. Chem. Soc.* and *Ph. Journ.*

Poisonous Metals in Preserved Foods.

THE fact that the amount of lead in the tin coating of vessels for preserved foods, and that in the solder with which they are united, have been limited by law in Germany to 1 per cent and 10 per cent respectively, has caused the adoption of vessels closed without a soldered joint, a rubber ring being substituted instead. The author having observed that preserved foods contained in vessels of this description, which appeared unexceptionable, were often contaminated with lead, has examined into the cause of its presence, and finds it to be due to the rubber ring employed.

The following examples are chosen from among the figures quoted by him:

1. India-rubber rings made in Paris and used by a large German firm. (*a*) Average weight of ring, 0.5 Gm.; ash, 66.6 per cent, consisting almost wholly of red lead; no antimony sulphide was present. (*b*) An experiment was made by exposing a rubber ring to the water under pressure of a temperature of 110° to 112° C. for thirty minutes. At the end of this time the ring was found to be softened, and 0.0286 Gm. red lead (misprinted Mn_3O_2 in original) was suspended in the water, which contained no lead in solution. (*c*) Another ring was similarly treated in the presence of 0.5 kilos of asparagus. The solution gave an immediate precipitate of lead sulphate on the addition of sulphuric acid, the quantity of lead in the solution corresponding to 60 per cent of the total amount in the ring.

2. India-rubber rings taken from tins of Australian meat, from a large English firm, had the same composition as those mentioned under 1.

3. Red rubber rings from Vienna contained 63 per cent of ash, the bulk of which was red lead.

4. Red rubber rings from a German factory gave similar results, save that a little antimony sulphide was present.

5. Numerous analyses of rings from other German firms gave similar figures.

In view of these facts the author is interesting himself in the manufacture and use of rings of a less poisonous character.—W. REUSS in *Chem. Zeit.* and *Analyst.*

Emulsions Made with Soap.

MR. P. VAN ASPEREN, a Dutch pharmacist, has lately been advocating the use of soft soap for making emulsions of cod-liver and castor oils and oil of turpentine. Mr. Van Asperen's idea is that emulsions made in this way mix with fifty times their weight of water, and that in his opinion is a great advantage. Cod-liver oil 20 parts, medicinal soft soap 1 part, and water 5 parts make the cod-liver oil basis, which can be diluted as required. For castor oil the proportions are the same, but a drop of peppermint oil is to be added to each ounce. For turpentine take 50 parts of the oil, 4 parts of soft soap, and 40 parts of water. In all cases dissolve the soap in water, and mix the solution with the oil by shaking. The method is not new. A very good way for taking the cod-liver oil emulsion is to add it to coffee or milk; with either it mixes perfectly.—After *Chem. and Drugg.*

Medicinal soft soap (*Sapo kalinus*, Pharm. Germ.) is prepared in the following manner:

Warm 20 parts of linseed oil, contained in a deep and capacious tin or porcelain vessel, on a steam bath and add to it, under constant stirring, 27 parts of solution of potassa (specific gravity 1.126–1.130, containing 15 per cent KOH) previously mixed with 2 parts of alcohol. Continue the heat until saponification is completed.

CORK TOPS.

WHITALL, TATUM & Co. have recently offered to the trade cork tops fitted with red seal corks, for use in prescription bottles. The top and cork form a complete bottle stopper, the head of which is of a hard composition, black and highly polished. Into this a cork is firmly secured. In the top of the head is a recess having a flat surface, so that a paper label may be attached when desired. The stoppers are furnished in four sizes. Each size is designated by a number corresponding to the number of the red seal cork with which it is fitted. The additional cost of the complete stopper over that of a plain cork is but trifling, while it is much neater in appearance and far more convenient to use, as it may be readily removed from the bottle without soiling the fingers or injuring the cork. The cork top will be found a desirable substitute for the paper bottle cap now used by many druggists, as it not only gives a finished appearance to the bottle, but may be retained by customers for further use, while the paper cap serves only for temporary decoration and is thrown away as soon as the bottle is opened. Prices: No. 3, with No. 3 red seal cork, $1.70 per gross; No. 4, with No. 4 red seal cork, $1.80 per gross; No. 5, with No. 5 red seal cork, $2.10 per gross; No. 6, with No. 6 red seal cork, $2.50 per gross. Discount to the trade, 40 per cent. In packages of 5 gross of a size, 50 per cent discount.

The Reactions of Salicylic Acid.

ACCORDING to Vortmann, neutral salicylates give no precipitate with barium chloride or calcium chloride, even on the addition of ammonia, or on heating, or when an equal bulk of alcohol is added. Contrary to these assertions, the author finds that a 20-per-cent solution of sodium salicylate gives an immediate precipitate on shaking with a strong solution of calcium chloride; a 10-per-cent solution also gives a precipitate when ammonia is added; even a 1-per-cent solution mixed with a few drops of strong calcium chloride solution gives a precipitate on adding a little ammonia and shaking or warming. A slight precipitate is produced when barium chloride is added to a 20-per-cent solution of sodium salicylate, and a turbidity when a 10-per-cent solution is used.—*Pharm. Post* and *The Analyst.*

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EDITORIAL.

WE have on several occasions discussed the principle and practical execution of the hypobromite test for urea, and have also published a table saving calculations to the person using the test. Recently we came in possession of information which showed that, while one of the improvements suggested by us had been adopted in some quarters, in others it had not been tried and its advantages had therefore not been realized. We shall here not speak of the test itself and its practical application, but only of the reagent.

Knop's original directions were to dissolve 100 Gm. of caustic soda in 250 Cc. of water, and to add to the solution 25 Cc. of bromine. Of this solution 5 Cc. were to be diluted with 20 Cc. of water, or any other quantity in the same proportion. Instead of this, some authorities (such as Neubauer and Vogl) advise to dissolve 100 Gm. of caustic soda in water to make 1,250 [which figure ought to be 1,350, if the same proportions are to be preserved], and then to add the 25 Cc. of bromine.

Now, it is well known that the finished test solution keeps only a short time, and that it is preferably made fresh when wanted. On the other hand, the handling of pure bromine is very disagreeable and often risky. It is a notorious fact that the glass stoppers of bromine vials are exceedingly obstinate and generally refuse to yield except to an expert, which the busy practitioner mostly is not. It is, therefore, desirable to substitute for the pure bromine a less obnoxious agent. Such an agent is a solution of bromine in water containing bromide of potassium. In order to counterbalance the water contained in this solution, the soda solution must, of course, be made stronger.

Our method of preparing and keeping the reagent is as follows:

I. SODA SOLUTION.

Dissolve 250 parts of commercial caustic soda in water to make 1,000 parts. Allow the solution to cool, when it may be used at once, if necessary. Keep it in a bottle closed with a rubber stopper, and, when it has become

clear by subsidence, transfer the clear solution to another bottle.

In reality a solution of about the specific gravity 1.250 is wanted, but a moderate deviation from this downward does no harm. It may be made much stronger, but this involves only a waste of material. A specific gravity of 1.250 represents a solution containing about 225 parts of pure caustic soda. As the commercial soda is, on an average, only 90 per cent pure, 250 parts of it correspond to 225 of the pure.

II. BROMINE SOLUTION.

Bromine	125 Gm.
Bromide of Potassium	125 "
Water	enough to make 1,000 Cc.

As it is very destructive to the balances and weights, and highly disagreeable to the operator to weigh out an exact quantity of bromine, it is preferable to weigh a bottle containing an approximately convenient amount of bromine, then to empty the contents into an aqueous solution of bromide of potassium stronger than required, and to weigh the empty bottle again. This will give the weight of bromine. Upon this basis is then adjusted the quantity of bromide of potassium and of water, so that the final solution will contain the quantities of ingredients above directed.

The finished solution must be kept in bottles having accurately ground stoppers. It has a dark-red color, gives off slight fumes of bromine, but in a very much less degree than bromine itself. The loss by escape of bromine vapor is very trifling. It may be poured out without causing inconvenience, provided only that it is kept tolerably cool.

For use, equal volumes of the two solutions are mixed. The reagent is then ready for instantaneous use.

The Pure Food Bill.

THIS bill, which has been introduced by Senator Paddock and reported favorably by the Committee on Agriculture, is, with some slight modifications, the original bill offered by the same senator in the last Congress. The bill, as it now stands, provides for the organization of a food section of the chemical division of the Department of Agriculture, under the charge of a corps of chemists, who, in cases of violation of the law, are to furnish such evidence as will be of service to the proper officials in the prosecution of such offenders. The act applies only to foods and drugs, and prohibits the introduction from one State into another, or from any foreign country into the United States, of articles which are adulterated or misrepresented, under penalty of fine and imprisonment.

Adulteration, as defined by this act, consists, as relates to drugs, in their possession of ingredients which lower their recognized and professed standards of strength and purity. In the case of foods it covers any process which impairs their value. The substitution of inferior substances in whole or in part for them; the abstraction of valuable ingredients, or the imitation of and selling of foods under the name of other articles, as well as their colorization in order to conceal damage—provided it be done to deceive the purchaser—are within the provisions of this act.—*Amer. Analyst.*

Mosquito Preventive.—The *Boston Advertiser*, in speaking of "How to get rid of household pests," gives a method of dealing with the wily mosquito which may be worth trial. It says: "Good pyrethrum powder is probably the best preventive of its annoyances. Moistened and made into cones, allowed to dry, and then burned in a closed chamber, the powder will either stupefy or kill, and is one of the best means of freeing chambers from mosquitoes."

NEWS AND NOTES.

MASSACHUSETTS.

THE class of '88 of the Massachusetts College of Pharmacy held its annual reunion and supper at the Quincy House in Boston on February 18th, and elected the following-named officers: President, John H. Chute, New Medford; vice-president, J. Allen Failby, Wellesley; secretary and treasurer, P. C. Klein, Boston.

The following minute, relative to the death of Prof. Pengra, was adopted:

Whereas, It has been the will of our Heavenly Father to remove from us our much-loved professor and friend, Dr. Charles P. Pengra, professor of materia medica and botany at the Massachusetts College of Pharmacy; and

Whereas, In his demise Mrs. Pengra has lost a devoted and loving husband, the college an able professor, Science a devoted son, and we a valued friend; be it

Resolved, That we, members of the class of '88, Massachusetts College of Pharmacy, do extend to Mrs. Dr. Pengra our heartfelt sympathy in this sad hour of her bereavement, and trust that she will have help and strength to look through the veil of her affliction and see that it is God's will: be it further

Resolved, That a copy of these resolutions be sent to Mrs. Pengra, and also be published in some of the pharmaceutical journals.

DR. R. W. GREENLEAF, who has held the position of instructor of botany and materia medica in the College of Pharmacy for the past two years, has been appointed to the professorship in the above department to succeed the late Dr. Pengra. Mr. Elis H. La Pierre, a member of the board of trustees, has been selected to fill the position vacated by Dr. Greenleaf.

At an examination held by the Board of Registration in Pharmacy on the 9th, 10th, and 11th of February the following applicants were examined and granted certificates: Arthur C. Esson, Haverhill; James P. Whitters, Taunton; Frank J. Quirin, Malden; Harrison Lake, Haverhill; William R. Webster, Irving Nute, and James A. Hunter, Boston; Arthur J. Travis, South Framingham; John P. Merrill, Woodstock, Vt.; Edwin F. Merrill, Orange; James H. McGrath, Fitchburg; Dennis Donovan and John W. Patrick, Lawrence; Henry A. Perham, Lexington.

S. A. D. SHEPPARD & Co. have recently improved the appearance of their store by the addition of a new soda fountain of Tufts' manufacture.

At the last meeting of the Massachusetts State Pharmaceutical Association, and on the suggestion of the retiring president, a committee was appointed to petition the Legislature for more stringent laws (or amendments to present laws) which would prevent the sale of liquor by so-called "registered pharmacists." Early in February a hearing was granted the petitioners. They asked for a bill to "fix the penalty for selling liquor by the glass by a registered pharmacist to be imprisonment for the first offence." A protracted hearing was held, but the legislative committee evidently deemed the existing laws sufficient, for they gave the petitioners "leave to withdraw."

J. F. DINGMAN, of Manchester, N. H., suffered a loss of $4,500 by fire on February 7th; insured for $2,500.

A suit has been brought in the United States Court by the California Fig Syrup Company, in which it is alleged that Kate Gardner Putnam and another, doing business under the name of Henry Thayer & Co., have infringed upon the trade mark of the complainant. The plaintiff is the manufacturer of a laxative preparation known as "Syrup of Figs," and the defendant is alleged to be the manufacturer of a preparation used for similar purposes, which the complainant alleges is given the colorable imitation of the plaintiff's trade mark by being called "Fig Syrup," in order that the advertising and popularity of the plaintiff's preparation may be used as a means of selling the preparation. The plaintiffs ask that the defendants be permanently enjoined from selling, manufacturing, or advertising any liquid laxative marked

with the name of "Syrup of Figs" or "Fig Syrup." The defendants have entered a demurrer, and claim that the plaintiffs have not shown that they are the owners of a valid trade mark, and also that it does not appear that the defendants have infringed the rights of the plaintiffs, and ask that the bill be dismissed. The case is now being heard on the demurrer.

F. A. DAVIDSON and wife are on a California tour for the benefit of the latter's health. During Mr. Davidson's absence his duties are attended to by Edwin W. Shedd.

J. T. BROWN & Co. have opened their new store on Tremont street, Boston. It will be run as a branch store until the expiration of the lease of their Washington street store, when the whole business will be transferred to the new establishment.

M. J. WILTSE & Co. have made many changes and improvements in the store of A. M. Haines & Co., corner of Washington and Cobb streets, Boston. Mr. Wiltse was for many years with Prof. Markoe, and is the present president of the Alumni Association of the Massachusetts College of Pharmacy.

WILSON J. LYNDE, a druggist at No. 2544 Washington street, Boston, was before the board of police on February 11th to answer to the charge of violating the conditions of his license by selling liquor without having it recorded on his book of sales. A similar charge was placed against Daniel E. Barry, of No. 373 West Broadway, but no decision was given in either case.

Capt. Hurley, of Station No. 9, appeared to complain of another druggist, George P. Hopkins, of No. 154 Blue Hill avenue, for violating the conditions of his license, but the case was continued because of sickness of the defendant.

F. H. PUTNAM has succeeded Churbuck & Appleton at 217 Shawmut avenue, Boston. After thoroughly renovating the store Mr. Putnam opened it on February 11th.

JOHN H. OXNARD took Thomas Rafferty into his store, corner of D street and West Broadway, Boston, on the night of February 13th, and gave him a place to sleep. He proved to be an ungrateful guest. Thomas arose first next morning and relieved Mr. Oxnard's till of $175. He took an early departure, and when Mr. Oxnard missed his money he notified the police and set them on his trail. Rafferty was afterward captured, and about $110 of the money was found sewed up in his clothing.

NEBRASKA.

THE next annual meeting of the Nebraska State Pharmaceutical Association (which promises to be one of the largest in the history of the organization) will take place at Grand Island, Neb., on June 7th, 8th, and 9th, 1892. Intending exhibitors should send their applications as soon as possible for the space desired to Henry D. Boyden, Esq., Chairman of Committee on Exhibits, Grand Island, at whose hands every courtesy and protection to goods are promised. Besides the opportunity afforded of identifying products with the retail trade of Nebraska, much pleasure is offered to exhibitors by the programme of sporting events.

At the examination of applicants for registration as registered pharmacists, held at the Dellone, Omaha, February 9th, and at the State House, Lincoln, February 20th, 1892, the following members of the board of examiners were present: Max Becht, Omaha; W. D. Haller, Blair; M. E. Shultz, Beatrice; Henry D. Boyden, Grand Island; and James Reed, Nebraska City. The following named persons were successful in passing the examination and received their certificates, viz.: F. D. Arnoldi, Chas. D. Beaton, Wm. J. Cogley, Anton Dahlstrom, Ben Hallo, Chas. E. Nemetz, H. W. Snow, and Chas. H. Schaeffer, Omaha; J. G. Marron and Morris Seligsohn, Lincoln; J. F. McKinley and G. A. Strande, Leight; H. P. McKnight and Will H. Reeves, Long Pine; N. C. Brewer, Jackson; Lon Cone Holdrige, E. H. Farnsley, Madison; L. O. Grisell, Bartley; Frank Harris, Ohiowa; A. F. Herrmann, Hay Springs; I. B. Jeffries, Hooper; O. A. Hoffman, Rising City; A. F. Lane, Petersburg; C. R. Mead, Blair; R. L. Newton, Bennet; W. H. Nelson, Superior; Earnest Pfeiffer, Plattsmouth; W. E. Riggs, Fairfield; T. H. Runyon, Beaver City; I. W. Leegarden, Weeping Water. By unanimous vote the percentage required to pass future examinations was raised to 70 per cent general average. Board adjourned to meet at Dellone, Omaha, May 11th; State House, Lincoln, May 10th; and G. A. R. Hall, Grand Island, June 7th, the last to accommodate those wishing to attend the meeting of the State Association held in Grand Island at that time.

HENRY D. BOYDEN.

GRAND ISLAND, NEB., February 12th, 1892.

INDIANA.

MR. J. W. OLCOTT has retired from business at Evansville, his creditors having taken possession of his store.

MR. W. C. ROUSH has recently opened a new drug store in Anderson, calling it the Temple Pharmacy.

SCOTT BROS. are a new firm in New Albany, Ind., although not strangers to the community. Both young men are residents of the city, and have served a long time in the business. They have made extensive improvements in the internal appearance of the store, and stocked it up in accordance with present and future demands of trade. They succeed Mr. Henry Klosse, who retires from business to enjoy a well-deserved rest in his old age.

ENGLAND.

A FEW more details concerning the attempt recently made here to protect the prices of patent and proprietary medicines have been supplied me and will be of interest. Mr. Johnston, the suburban chemist who devised and attempted the scheme, is unable to supply the names and opinions which he received on the subject from many firms and manufacturers. Nearly all of the communications were marked "private," which is to be regretted, as it would be distinctly of considerable interest to hear what Messrs. Beecham, Eno, Holloway, Pears, Steedman, etc., etc., think of the subject. In the copy of the circular addressed to the wholesalers I notice that Mr. Johnston claims that 83 per cent of the retailers canvassed in various towns were in favor of his scheme. With regard to the numbering clause, which caused some opposition from wholesalers, owing to the trouble entailed, the circular says: "The outside label on every packet would have a consecutive number like those on the inner labels on Burroughs, Wellcome & Co.'s 'Hazeline.' Each dozen or gross, when put up in the manufacturer's packing room, would have the numbers of the contents stated outside, and before despatching, these numbers would be entered in a book kept for the purpose. The wholesalers should then be held responsible for the proper disposal of such supplies. For their own protection they would probably make it a rule to register all sales." The object of this part of the scheme was to enable the "cutter" to be traced and his supplies cut off. A bottle or box of a protected article would be obtained from the cutter and the number on it then communicated to the proprietor. The proprietor would refer to his register and see what wholesaler he had sent it to, and would notify him and other wholesalers not to supply him either. With regard to the idea that the stores and muslin druggists do not substitute, Mr. Johnston points out that at one of the largest in London the countermen are paid a commission of 2½ per cent on all the substitution sales they effect. In the circular to the retail trade it was estimated that fully 20 per cent of sales of substituted articles took place in the chemists' shops, consequently the proprietors would reap the benefit of this if the practice were abandoned. It is also pointed out that the clause which binds the retailer not to recommend a substitute was a sacrifice which was not asked by Messrs. Elliman in their agreement against excessive cutting, and yet that firm's sales last year were increased by $60,000. The result has indicated that the want of complete unanimity on the subject amongst retailers is reflected amongst the proprietors, whilst the wholesalers naturally discourage the idea as causing extra trouble without commensurate recompense. Mr. Johnston's opinion is probably right, that English makers are opposed to protection, but this national instinct may be revolutionized by later experience when they are able to appreciate the mutual advantages of the proposed scheme.

The extraordinary rush for eucalyptus oil during the recent epidemic of influenza is an amusing instance of the credulity of the public. Dr. Curgenven had advocated its use a year or so ago in sprinkling rooms where infectious disease was located. Dr. Edgelow announced that he had found it useful when inhaled during the catarrh stage of influenza. But it remained for a large insurance office in London to discover that the exhibition of the oil about the premises procured complete immunity from the disease. This they communicated to the *Times* newspaper, and immediately the eucalyptus "boom" set in. The price of the oil was then about $1 per pound. In three days it was $2 and in six $3. Those firms who held good stocks must have reaped a considerable harvest. Nor did the retail chemists allow the opportunity to pass without having a share in it. The ordinary price is about 8 to 12 cents an ounce, but at the height of the run the average price was 32 cents. I am afraid that some chemists, when they gravely recommended their customers to sprinkle the oil lavishly about the house, must have "winked the other eye." It must be admitted that the medical profession did not join in the universal adoration of eucalyptus oil as a prophylactic, but, as they did not offer anything else as a substitute, they were naturally disregarded. Now that the subject can be reviewed calmly, experience demonstrates conclusively that the oil is not only useless but positively harmful when the disease is manifest. Dr. Wylie sends the following neat comment on the subject to the *British Medical Journal:* "Last year I fancied eucalyptus oil was just the microbe killer required for influenza, and tried it on the first case I was called to attend. There was a little unpleasantness about it, however, as the patient had a decided opinion, after he had used it some time, that it made him worse, increasing the headache, etc. I thought this ungrateful on his part, and probably an idiosyncrasy, and tried other remedies, and he soon recovered. The next patient was a lady who entered into the treatment with great enthusiasm, inhaling the vapor by the hour, and so saturating the room that, if it had been hostile to the vitality and activity of the microbe, I thought we should have a cure in no time. On my next visit I was told she could stand the oil no longer, as it made the headache worse and increased the nausea. I tried other remedies and the patient soon got well. Then I took the disease myself, and, still having faith in the drug, tried it on cotton wool and inhaling from boiling water and various other ways. Somehow I soon became tired of it, then took a positive dislike to it, and finally could not endure it. It did me no good whatever, and only made me more uncomfortable."

At one time the epidemic both in London and the provinces assumed the disastrous dimensions of a plague. The death rate of London rose from 15 to 51 per thousand. Everything tends to show that the worst is over, but there are very few firms that are not suffering from the loss of a portion of their staff. It may be of interest to record here that Dr. Robson Roose, one of our leading West End physicians, who has treated upward of 300 cases, finds that salicin is extremely useful when muscular pains are prevalent, or a mixture containing bicarbonate of potash, carbonate of ammonia, and solution of acetate of ammonia in camphor water. When hyperpyrexia was marked, a mixture containing 5 gr. each of salicylate of soda, bromide of potash, and antipyrine, with 20 minims of aromatic spirit of ammonia in an ounce of water, given every four hours, soon relieved the symptoms.

The discussion at the last meeting of the council of the Pharmaceutical Society, when it was suggested that a title, such as Discoverer in Pharmacy, should be conferred upon those who distinguish themselves in pharmacological research, can hardly be taken *au serieux*. It is an open secret that the Research Laboratory cannot get enough students, although no fee is charged, and it is suggested that the conferring of a certificate, and possibly of some mark of distinction, might alter this. Unfortunately, this will not effect its object as long as the directorship remains in unpopular hands, and whilst investigations of little pharmaceutical interest are alone undertaken. The *Chemist and Druggist* suggests that John Bond, of marking-ink fame, and Mother Siegel, should be the first recipients!

London Market Report.

MINCING LANE, February 16th, 1892.

During the excitement produced by the recurrence of influenza one or two drugs showed phenomenal rates. Eucalyptus oil, which last week was unobtainable under $3 per pound, is now dull at 1.5. Quinine also stood for a short time at 24 cents, but, in spite of a good demand at the auctions for cinchona, has receded to 20 cents. Importers of quicksilver have reduced their price, and mercurials are consequently cheaper. Opium is easier, and a reduction of 6 cents per pound all round is cabled from Smyrna. The Alkali Co. have also reduced their rates for soda crystals, which has considerably augmented the demand. Senega, ipecacuanha, and ergot are all dearer.

The following are current prices:

Acid, Carbolic	per lb.,	$0.13	Nux Vomica	per lb.,	$0.03
Citric	"	.32	Opium	"	1.90
Oxalic	"	.07	Quicksilver	"	.36
Tartaric	"	.24	Calomel	"	.64
Arsenic, white	per cwt.,	2.70	Corrosive Sublimate	"	.56
Aniseed, Star	per lb.,	.24	White precip.	"	.70
Bleaching Powder	per cwt.,	2.04	Senega Root	"	.39
Borax	"	7.0	Shellac TN	"	.21
Camphor, refined	per lb.,	.40	Button	"	.22
Cinchona Calisaya	"	.12	Soda, Bicarb	per cwt.,	1.68
African quill	"	.05	Caustic	"	2.56
Cream of Tartar	"	.22	Crystals	"	.78
Cascara Sagrada	"	.06	Hyposulphite	"	2.10
Calumba Root	"	.07	Sulphur Flowers	"	2.04
Ergot, Spanish	"	.66	Roll	"	1.92
Ipecacuanha	"	2.0	Tonqua Beans	per lb.,	.72
Carthagena	"	1.40			
Jalap	"	.34			

MESSRS. BAINBRIDGE & CONSTANTIN have just consummated a trade with Newhouse & Co., Louisville, Ky., and take immediate possession. Both are active, go-ahead business men, and will at once take a leading position in pharmaceutical circles there.

MR. W. F. GRASTY has purchased the store so long owned and successfully conducted by Mr. B. L. Robertson in Henderson, Ky. Mr. Grasty starts out with the evident determination to win great success here.

The Medical Association of Georgia will meet in Columbus, Ga., on April 20th, 21st, and 22d. The officers are: President, G. W. Mulligan, M.D., of Washington, Ga.; vice-presidents, James M. Hull, M.D., of Augusta, Mark H. O'Daniel, M.D., of Macon; treasurer, E. C. Goodrich, M.D., of Augusta; secretary, Dan H. Howell, M.D., of Atlanta, Ga.

Labelling Chemical Glassware.—Prof. F. P. Dunnington, in a note under the above caption (*Jour. Anal. and App. Chem.*, 5, 360), recommends grinding a portion of the surface of the glass to prepare it for receiving ordinary pencil marks. I find this unnecessary, and prefer to use the *colored pencils* especially made for the purpose by A. W. Faber for writing on glass, porcelain, and metal. The small amount of grease in the crayon causes the marks to adhere to the smooth surface of the glass, and *grinding* is superfluous. The pencils can be had of all colors.—H. C. B[OLTON] in *Jour. Anal. and App. Chem.*, January, 1892.

Is Subacetate of Lead a Solution or a Chemical Preparation?—This question has recently occupied the attention of the medical officers of Prussia, and also of several chemical experts as well as jurists. The several authorities disagreed in their decision. The editor of the *Pharm. Zeitung* (1892, January 23d) comes to the conclusion that it should be classed as a solution. He argues as follows: Although the solution of subacetate of lead, when evaporated to dryness, does not leave behind a chemical compound of as exact and unvarying a composition as is, for instance, sodium chloride or ferric chloride, yet if the access of carbonic acid is prevented the residue consists of a mixture of mono- and dibasic acetate of lead, which may be again brought into perfect solution by the addition of water.